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36. Proposed by O. W. ANTHONY, Mexico, Missouri.

From two points, one on each of the opposite sides of a parallelogram, lines are drawn to the opposite vertics. Through the points of intersection of these lines a line is drawn. Prove that it divides the parallelogram into two equal parts.

Solutiou by ALFRED HUME, C. E., D. Sc., Professor of Mathematics in the University of Mississippi, University P. O., Mississippi.

Let $OABC$ be the parallelogram, O the lower left-hand vertex, OA the base; D and E points on OA and CB respectively.

If $OA=b$, $OC=a$, $OD=n$, $CE=m$, then, taking OA as the X-axis and OC as the Y-axis, the points O,A,B,C,D, and E will be given by the co-ordinates $(0,0),(b,0),b,a),(0,a),(n,0)$, and (m,a) respectively.

It follows that the equation of OE is $\frac{y}{a}=\frac{x}{m}$;............(1).

The equation of CD is $\frac{y}{a}+\frac{x}{n}=1$;..........(2).

The equation of BD is $y=\frac{-a}{n-b}(x-n)$.....(3).

The equation of EA is $y=\frac{-a}{b-m}(x-b)$......(4).

From (1) and (2) the intersection of OE and CD is

$\left(\frac{mn}{m+n},\frac{an}{m+n}\right)$ which denote by (x',y').

From (3) and (4) the intersection of BD and EA is

$\left(\frac{b^2-mn}{2b-m-n},\frac{-a(n-b)}{2b-m-n}\right)$ which denote by (x'',y'').

The equation of the line passing through these points of intersection is

$y-y'=\frac{y'-y''}{x'-x''}(x-x')$....(5).

If the center of the parallelogram is on this line its co-ordinates, $\left(\frac{b}{2}\cdot\frac{a}{2}\right)$, will satisfy (5).

Substituting and reducing, $\frac{1}{2}-\frac{n}{m+n}=\frac{m-n}{2(m+n)}$, or (5) is satisfied.

Since every line which passses through the center of aparallelogram divides it into two equal parts, the proposition is established.

PROBLEMS.

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39. Proposed by J. K. ELLWOOD, Principal of Colfax Schools, Pittsburg, Pennsylvania

If on the three sides of any plane triangle equilateral triangles be described, the lines joining the centres of these equilateral triangles form an equilateral triangle.

40. Proposed by J. C. CORBIN, Pine Bluff, Arkansas.